Gender Equity in the Mathematics Classroom

An Honors Thesis (Honors 499)

by

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Abstract

There is much current debate about the nature of the gender gap occurring in classrooms. Some researchers argue that it has actually reversed, with females outperforming males academically. While others claim that there exists a gender gap in favor of males in high-level mathematics classes. I decided to explore this topic by creating and distributing my own survey in an eighth-grade mathematics classroom. I give a brief analysis of the factors that research has suggested may contribute to female underperformance and lack of participation in higher-level mathematics courses and careers. Then, the paper analyzes at what level each of the genders are performing mathematically as well as their various attitudes about such factors. Conclusions drawn from the resulting data are also included.

Acknowledgements

-I want to thank Dr. Beverly Hartter for advising me through this project. She was extremely helpful through the process of creating the survey, gaining approval to distribute the survey, and checking my paper for technical errors.

- I would also like to thank Dr. Robert Nelson for helping me to analyze the collected data.

-Finally, I would like to thank Trista Camp and Jim Males for being willing to use their classroom time to distribute and collect parent consent forms and surveys. Without them, this thesis would not have been possible.

In the spring semester of 2006, my junior year at Ball State University, my professor in an educational foundation course quickly mentioned that the gender gap occurring in classrooms for years has actually reversed, with females outperforming males academically. Since I had written a paper the previous semester about the current gender gap in favor of males in high-level mathematics classes, this comment thoroughly surprised me. Adding to the paper I had written, I decided to further explore this topic with my own survey in the form of a senior thesis. I wanted to know at what level each of the genders were performing mathematically as well as their various attitudes about factors research had suggested that may contribute to female underperformance and lack of participating in higher-level mathematics courses and careers.

Review of Research

The current literature suggests that mathematical SAT score differences remain between genders, and the differences grow exponentially in the upper level of the distribution with the ratio at "...2:1 for adolescents with SAT-M scores of at least 500, 4:1 for those with scores of at least 600, and 13:1 for those with scores of at least 700" (Benbow et al., 2000). The lack of interest from females in regard to mathematics does not occur naturally. When looking at trends over time, the majority of first grade girls choose mathematics when asked to name their favorite subject area (Damarin, 2000). Generally, it is in middle school that the interest in mathematics decreases and continues to plummet throughout high school (Gifted Girls and Science: Revisiting the Issues, 1996).

The decrease of interest in mathematics during the adolescent years may have a great deal to do with peer influence. Research demonstrates that "adolescents think less

of girls who are good in math," and "girls know that men don't want competition from females in traditionally male fields" (Gallagher, 1996). Pursuit of mathematics by girls often comes in direct conflict with their desire to be accepted by their peer group. At a time when most girls simply want to fit in with their peers and are beginning to become interested in boys, it is simply easier to diminish the importance of mathematics in order to achieve their more immediate social goals.

The environment in many mathematics classrooms is often specifically geared toward male-style learning. For instance, a teacher stands at the board and lectures and then students work quietly on their own on homework. Discussion and partner work are often discouraged. This is in direct contrast with the female desire to interact with others while completing a task. Even after-school participation for the mathematically gifted often involves participation in individual, standardized, competitive tests—situations in which students are usually discouraged from actually talking to one another (Damarin, 2000). This level of individualism turns off females, who are generally known to go into fields and enjoy subjects that are relatively social.

An extremely important factor with regards to female mathematical performance is the expectations of parents. "In some studies, parents' beliefs about children's abilities had an even greater effect on children's self-perceptions than previous performance" (Jacobs et al., 1994) This implies that even female students who receive high grades in mathematics may perceive themselves as having a lower ability level than a boy receiving equivalent grades. While parents of gifted girls expect their daughters to do well in all subjects, they deem the sciences as less relevant to their future careers (Schober et al., 2004)

Many studies suggest that girls, and especially gifted girls, underrate aptitude in mathematics and the natural sciences even though it is in direct contrast with their actual performance. They are less self-assured in their abilities, have lower expectations for themselves in their class work, have higher levels of test anxiety than boys, and cite effort rather than talent when justifying their successes (Schober et al., 2004). For this reason, academic ability is generally not a good predictor of whether or not a female will take elective science or mathematics courses. While females and males often complete the same number of years of math courses, males generally enroll in higher-level coursework. "Girls more than boys choose not to continue advanced science and mathematics coursework beyond minimum requirements for high school graduation" (Gifted Girls and Science: Revisiting the Issues, 1996).

Method

Since research indicates that females often begin to lose interest in mathematics during their middle school years, two eighth-grade mathematics teachers at Greenwood Middle School (GMS) were asked to distribute the attached survey in their classroom (Addendum A). The survey includes four non-gender biased mathematics word problems. Each of these problems can be solved in various ways through the use of algebra, drawing of pictures, or logical reasoning. These questions were used to evaluate the mathematical performance of both genders. The survey is also comprised of twelve attitudinal-based questions to which students responded using a five-point Likert scale. The first three questions simply evaluate the level at which the student views him or herself mathematically and whether or not he or she enjoys the subject matter. The next two questions examine the importance that the student deems mathematics to have both

currently and in the future. However, it is the last six questions that relate directly to the reasons suggested by research for female underperformance in the mathematics classroom. Questions six and seven evaluate the future plans of the student in regard to mathematics. Question eight explores the social environment in which the student prefers to work. Question nine and ten assess parental support and encouragement concerning mathematics, and questions eleven and twelve appraise peer opinions of those who excel mathematically.

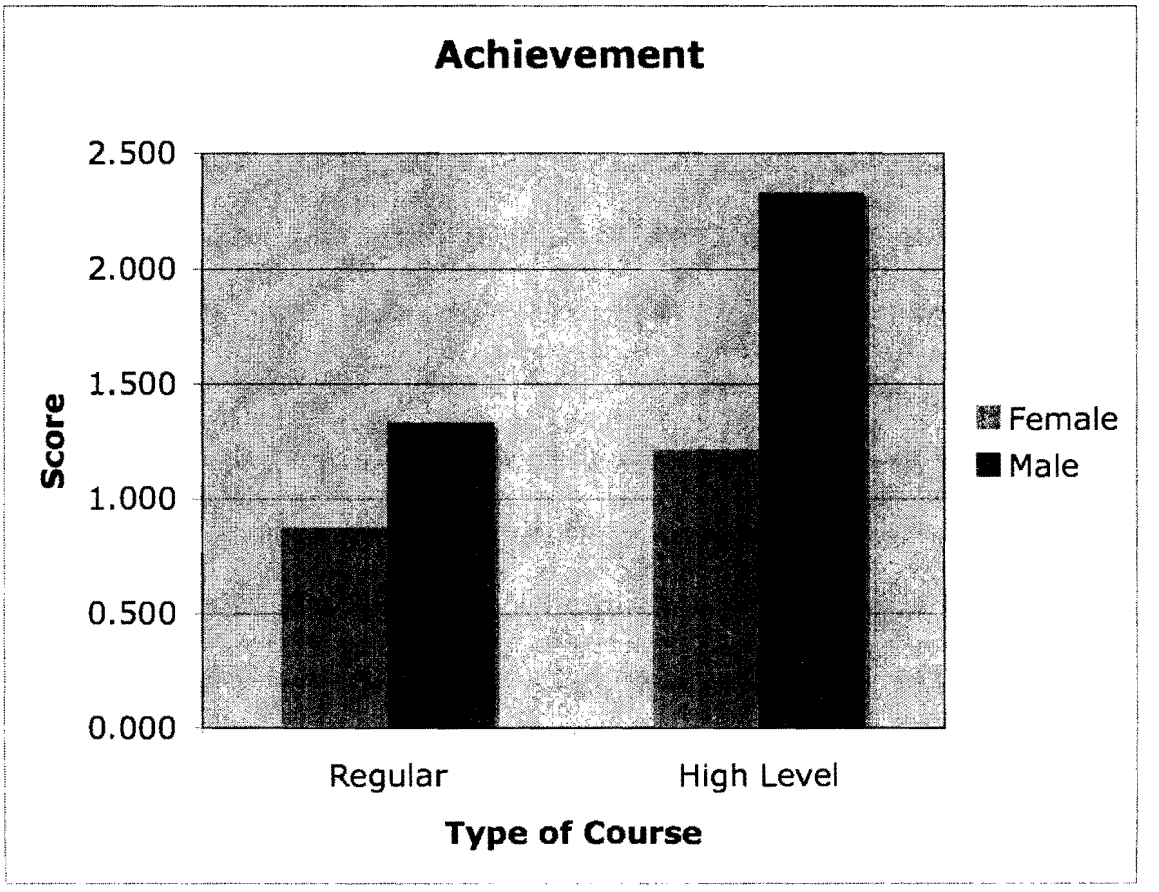
After a thorough process involving receiving permission from the teachers, principal, superintendent, and school board as well as the Institutional Review Board (IRB), the two teachers sent home the attached parent consent form (Addendum B) for the students and parents to sign granting permission to participate in the anonymous survey. Those without parental permission were not allowed to participate and instead occupied themselves by either completing previously assigned homework or working on a sodoku puzzle that had been provided to the teachers. One hundred thirty-seven parental consent forms were returned—eighty-nine females and forty-eight males. The students ranged from twelve to fifteen years of age.

Each teacher distributed the surveys to all of their classes within the regularly scheduled class time. Students were instructed not to include their names on the survey. Students were allowed to complete their work on a separate sheet of paper that was not turned in with the completed surveys. The teachers then collected the completed surveys and placed them in a sealed, manila envelope. The high-level class' surveys were placed in a sealed, manila envelope marked with the letters 'HL.' Those surveys in the high-level envelope were then analyzed separately from the rest of the data. The results were

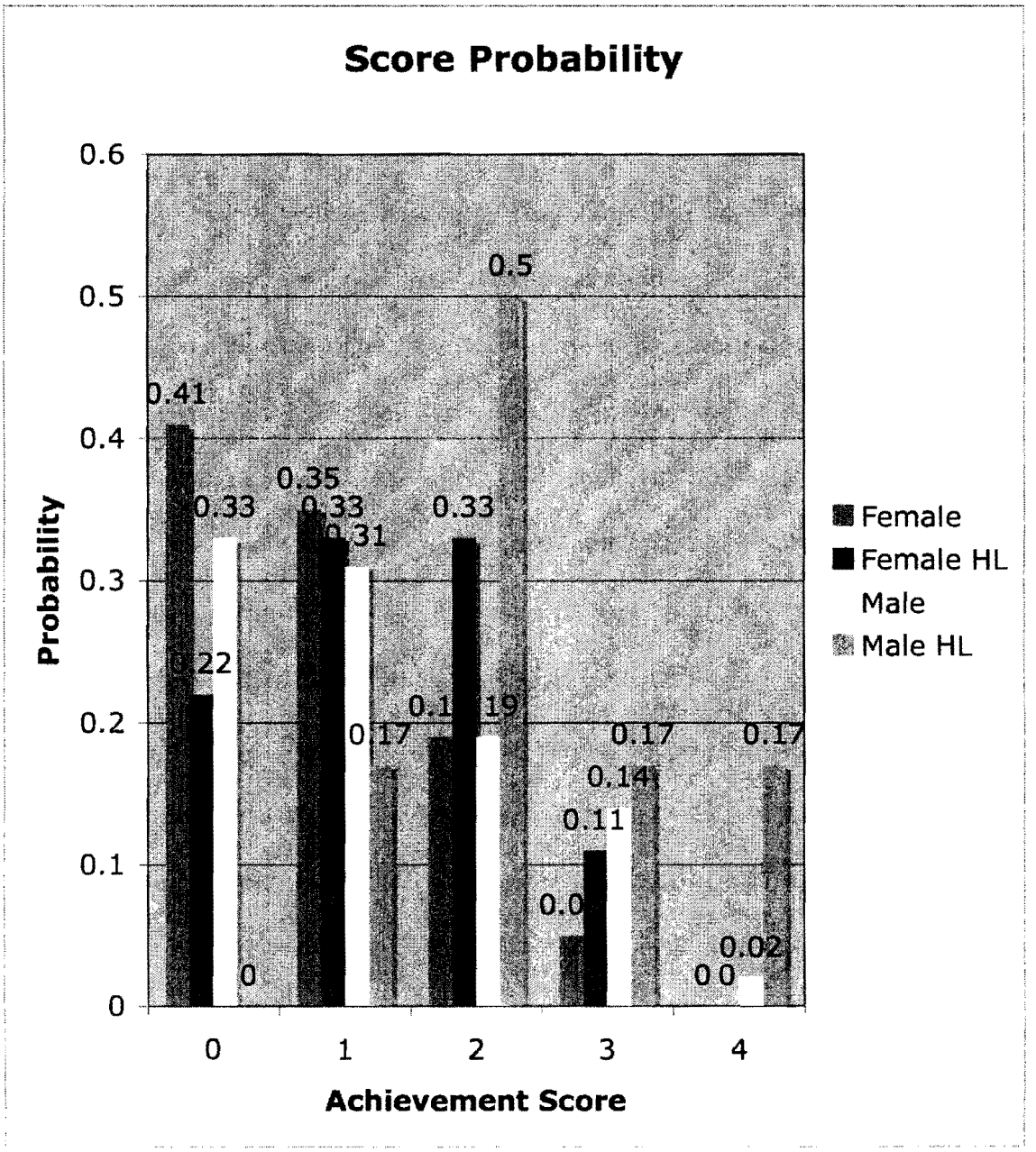
recorded from the anonymous surveys into an Excel spreadsheet, and the original surveys disposed of.

Results

Attached is a copy of the raw data of female scores (Addendum C), male scores (Addendum D), and high-level scores of both males and females (Addendum E). A 'Y' was placed next to the students name for a correct answer, an 'N' for an incorrect answer, and an 'n/a' for a question that was left blank. The number of 'Y's was then totaled in the 'Total Correct' column. The mean value of content scores was .875 for females, 1.214 for males, 1.333 for high level females, and 2.333 for high level males as can be seen graphically below.



All scores are out of a possible four points. At first glance, the males seem to be greatly outperforming the females at all levels. The chart below depicts the probability of each score given each set of scores—female, male, high-level female, and high-level male. For example, if one were to randomly choose a high-level male, the probability of him having answered two questions correctly is .5.



To further explore this idea, the data were evaluated through the use of a Chi squared test.

Observed Data
High Level

	0	1	2	3	4	
Females	2	3	3	1	0	***9***
Males	0	1	3	1	1	***6***
	2	***4***	***6***	***2***	***1***	***15***

Expected Data
High Level

	0	1	2	3	4	
Females	*1.2*	*2.4*	*3.6*	*1.2*	*.6*	***9***
Males	*.8*	*1.6*	*1.2*	*.8*	*.4*	***6***
	2	***4***	***6***	***2***	***1***	***15***

Observed Data
Regular

	0	1	2	3	4	
Females	33	28	15	4	0	***80***
Males	14	13	8	6	1	***42***
	47	***41***	***23***	***10***	***1***	***122***

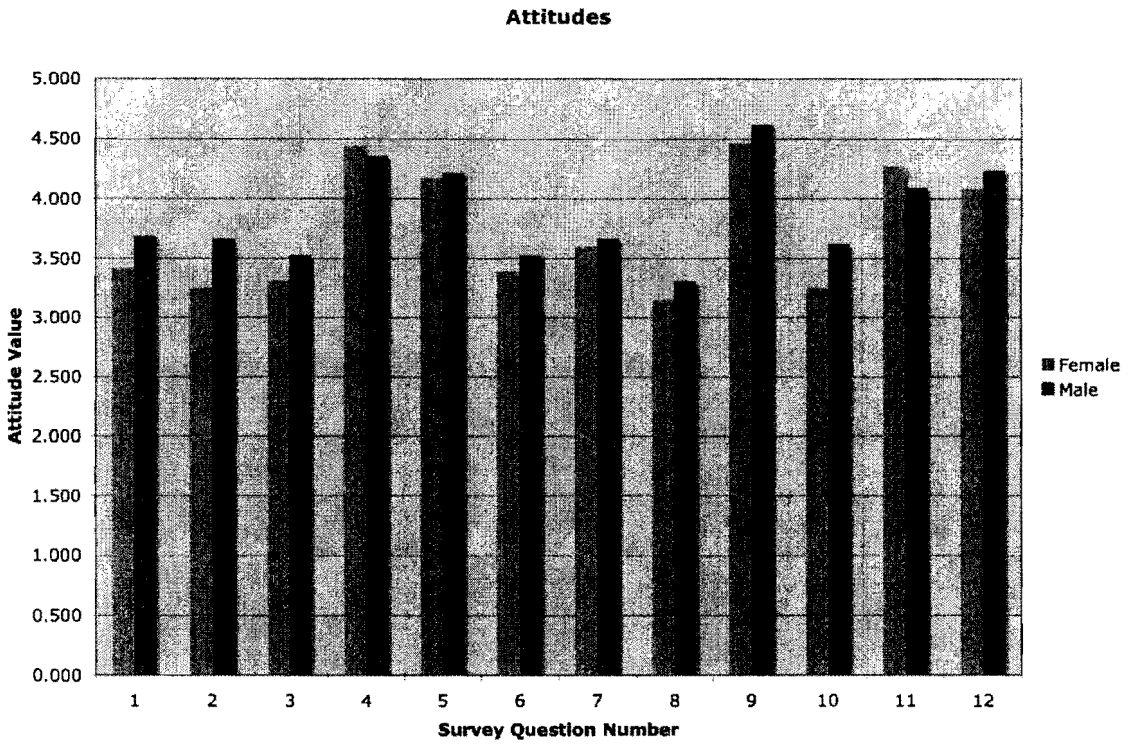
Expected Data
Regular

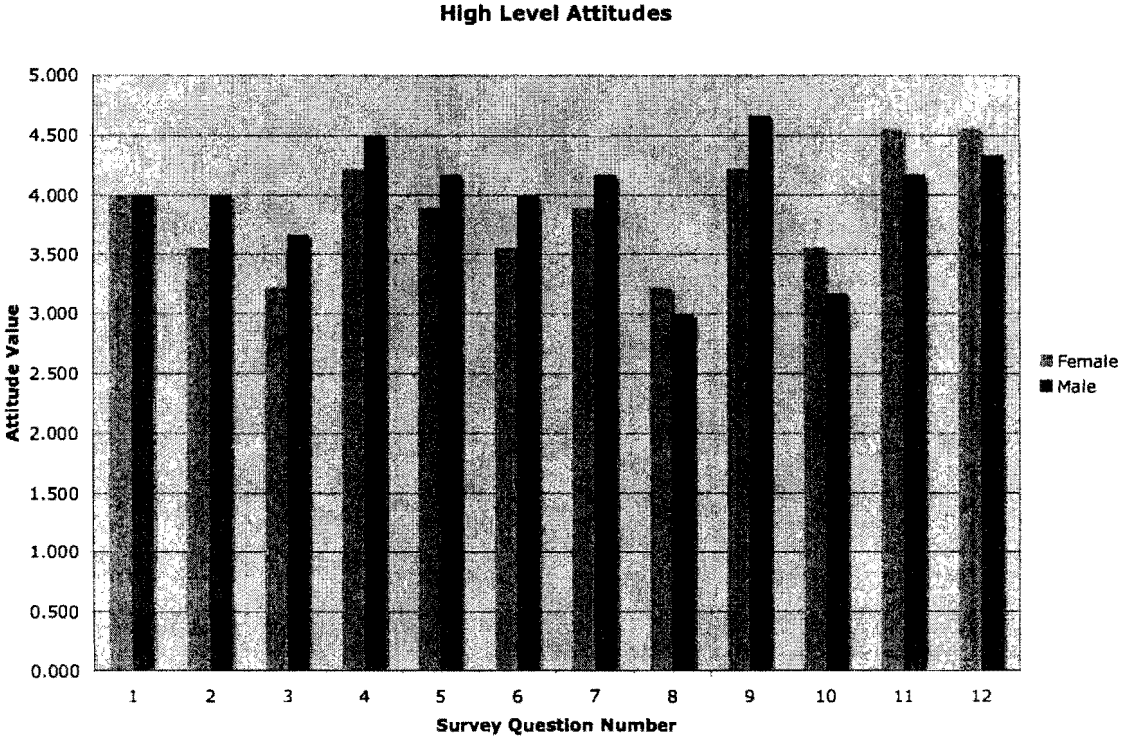
	0	1	2	3	4	
Females	30.82	26.89	15.08	6.56	0.66	***80***
Males	16.18	14.11	7.92	3.44	0.34	***42***
	47	***41***	***23***	***10***	***1***	***122***

Based on the above tables, the chi-squared value for the high-level course is equal to 6.09166667, and the chi-squared value for the regular courses equals 5.427609895. Since there are four degrees of freedom, we need a chi-squared value of 9.488 or greater in order to reject the null hypothesis that gender and content scores are independent. Thus, despite earlier inclinations, we are unable to make the claim that females are performing at a lower level mathematically than their male counterparts in either regular or high-level courses.

Next, the results of the Liker scale, attitude questions were evaluated. First, the means of each of the questions were calculated for males and females separately. The

two charts below show how these means vary between males and females for regular and high-level courses.

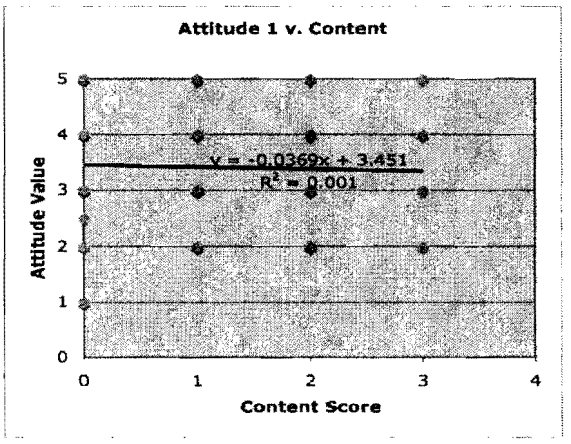




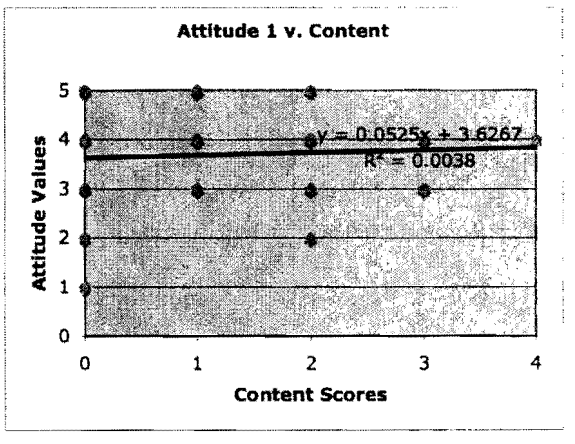
Based on both charts shown above, one can see that, while not always in a significant proportion, males tended to agree more strongly with the statements than did females. However, this was slightly less true for the high-level students. The girls in the high-level class preferred working independently, believed their parents would be happy if they chose a career in mathematics, and agreed that boys and girls who were good at math could be cool more so than the males in their class. These stronger feelings of agreement may be some indication of why these particular females have been successful enough in mathematics thus far to be placed in a high-level course.

The next step was to evaluate whether or not scores on the mathematical portion of the survey affected attitudes about mathematics. For example, was a student more likely to enjoy mathematics or take calculus in high school if he or she earned a higher content score? To evaluate these questions, relationships of linear regression were calculated. The following are the linear regression graphs for each of the attitude statements for males and females:

FEMALES



MALES



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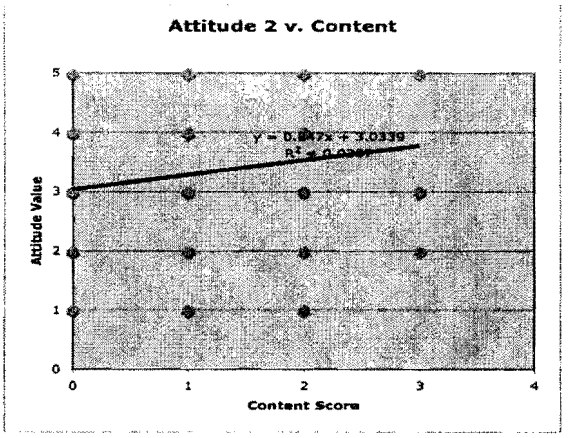
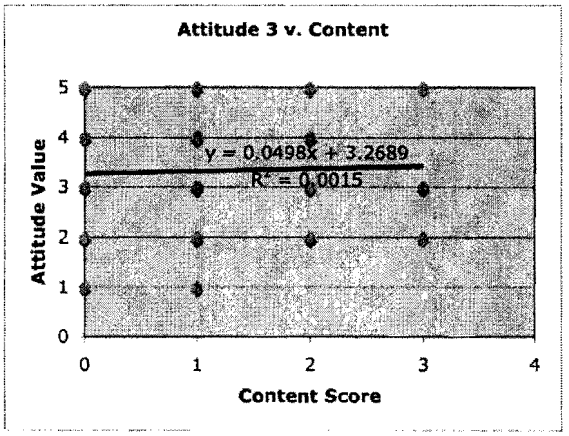
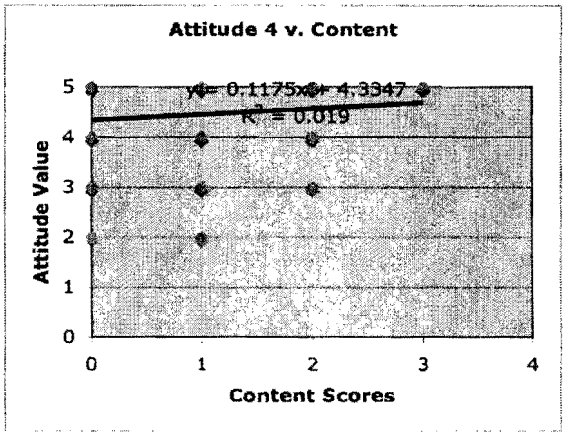
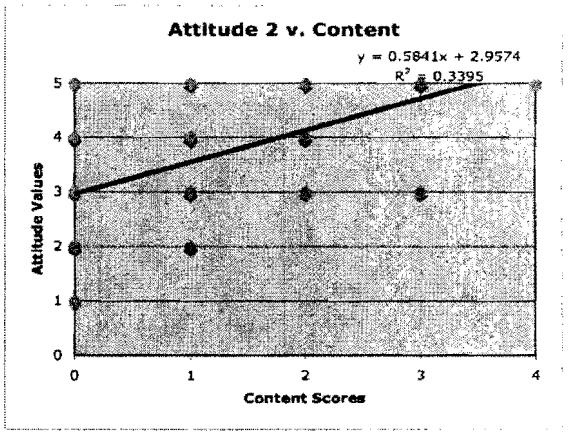
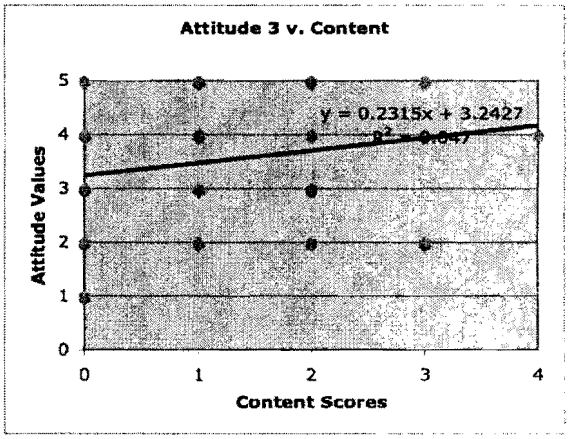


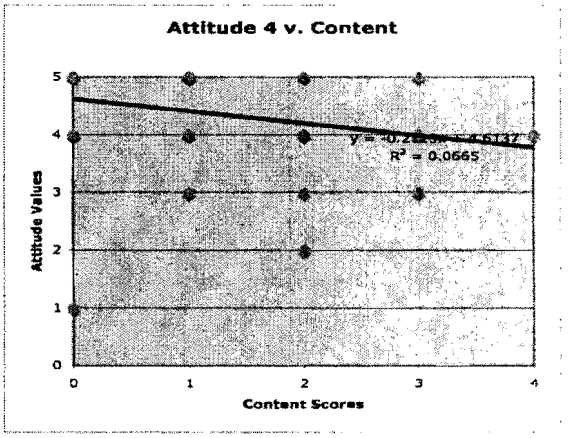




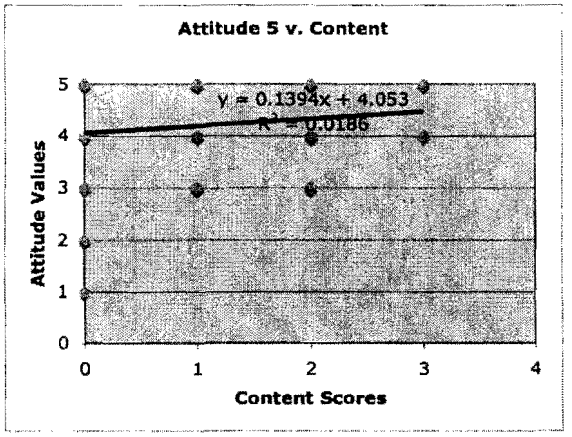
MALES

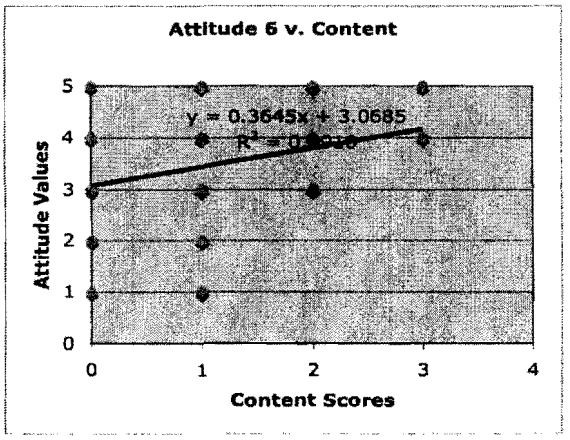


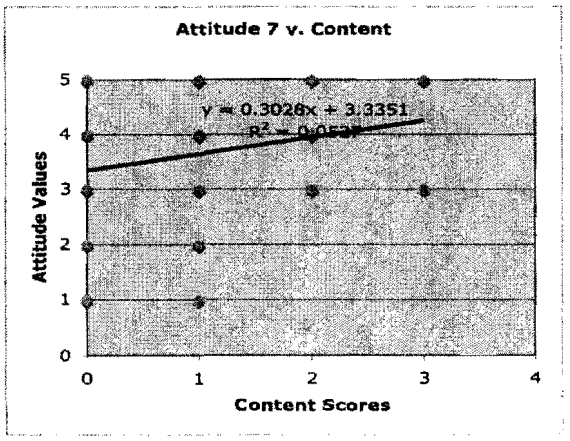




FEMALES







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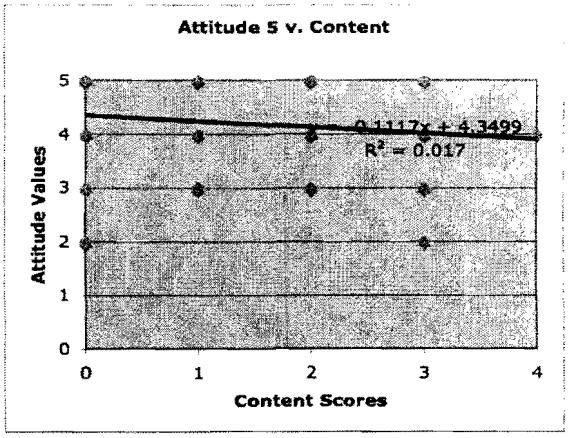

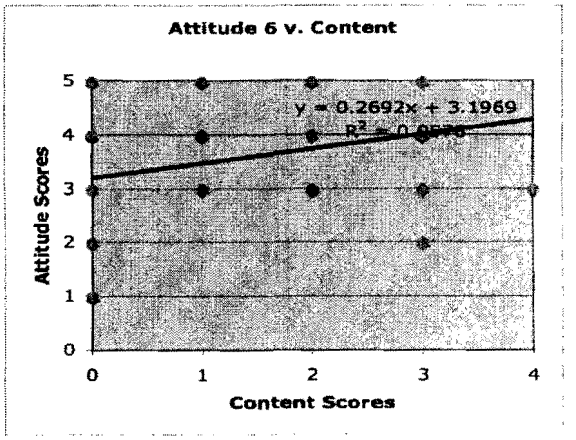

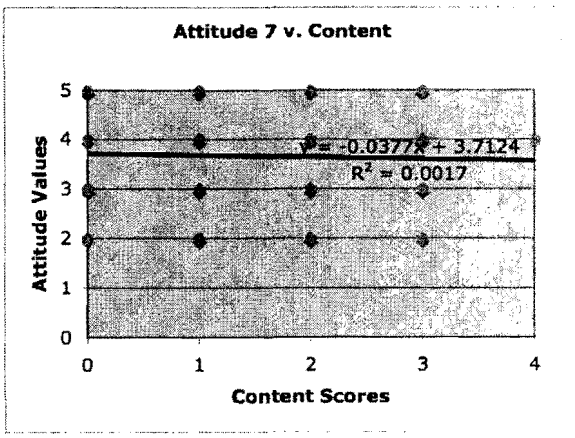

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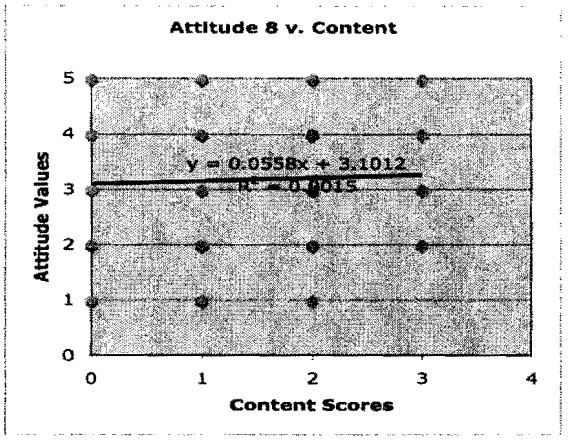

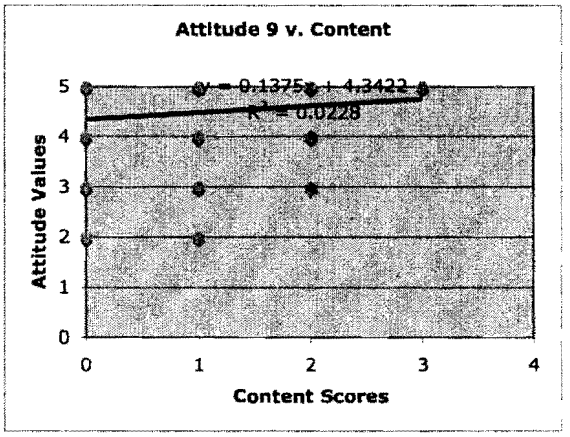

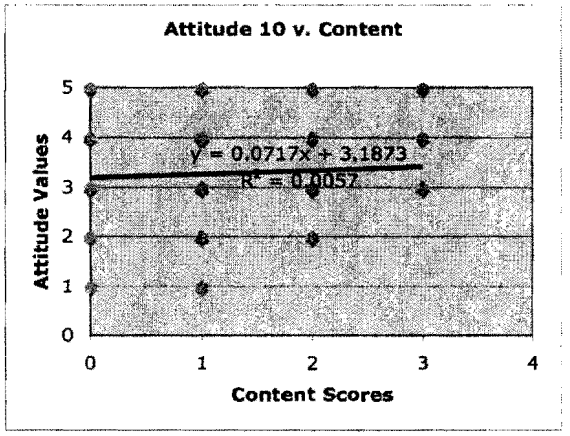

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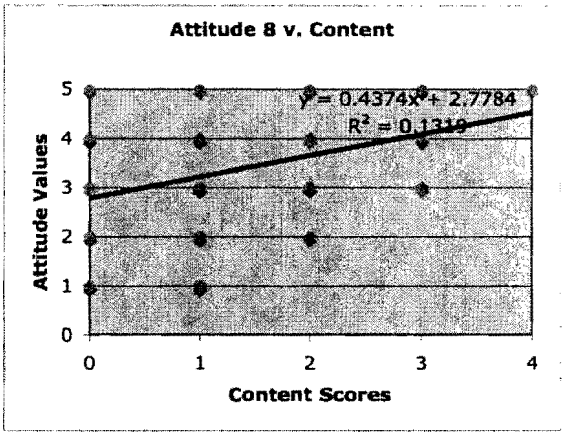

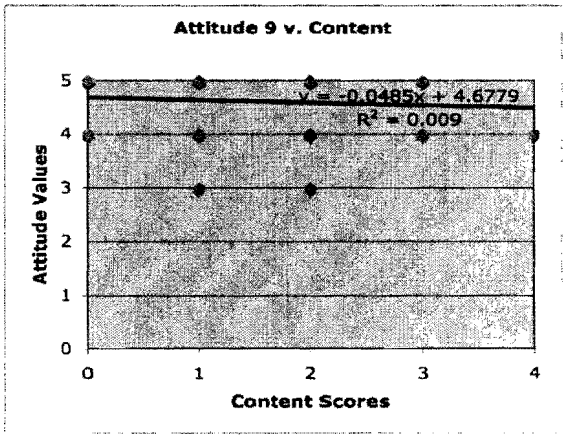

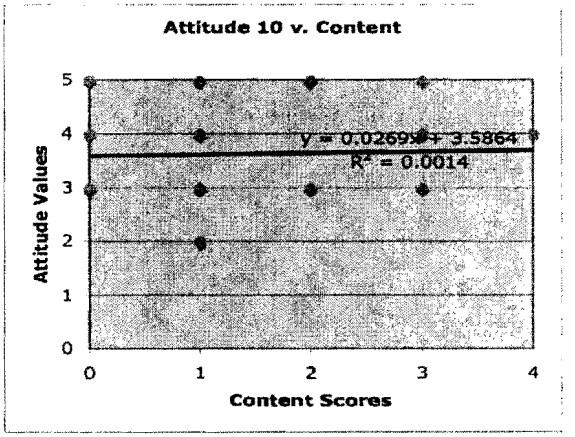

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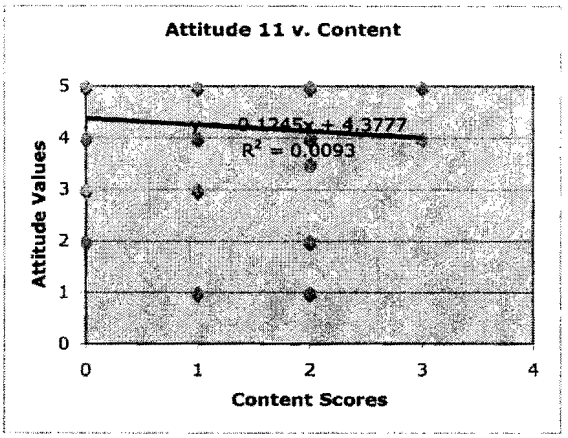

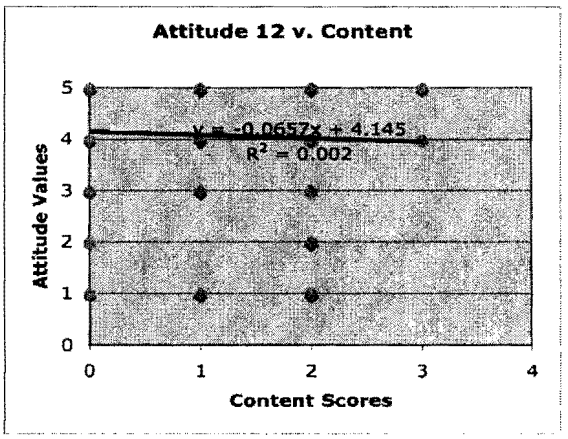

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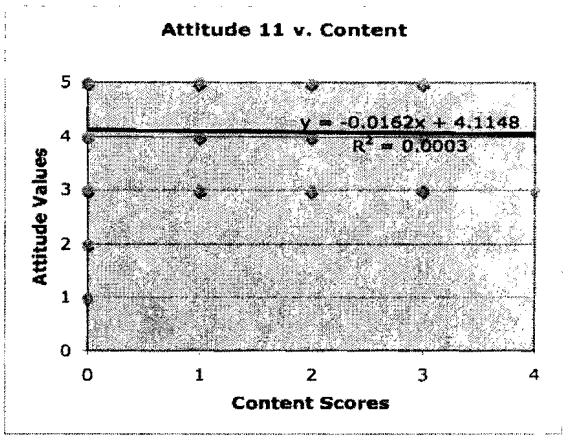
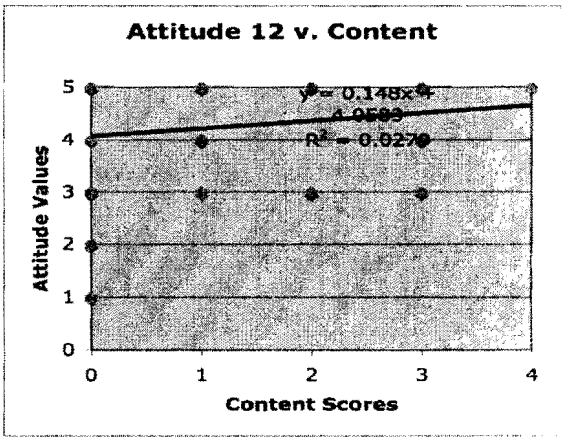
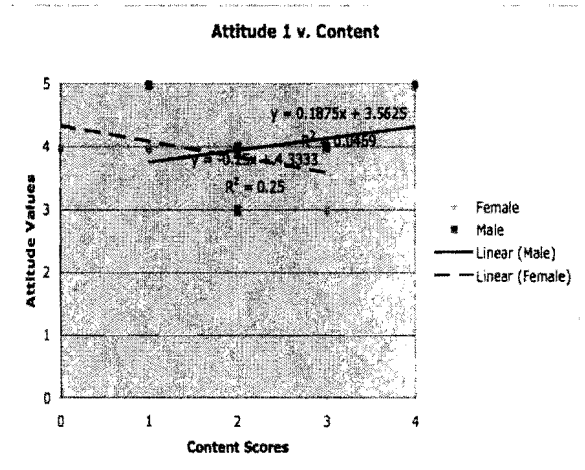
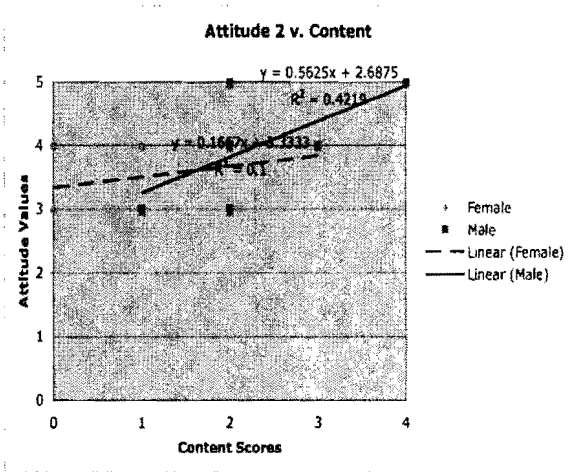


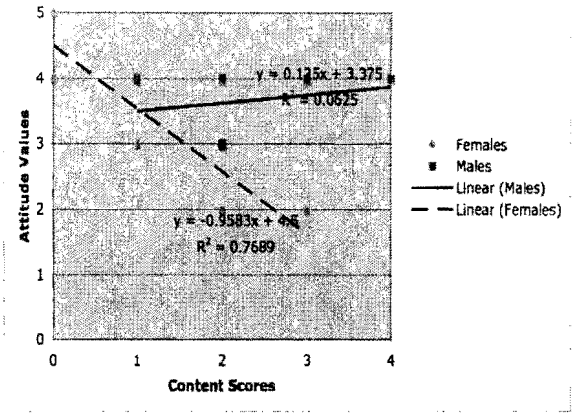


HIGH LEVEL





Attitude 3 v. Content



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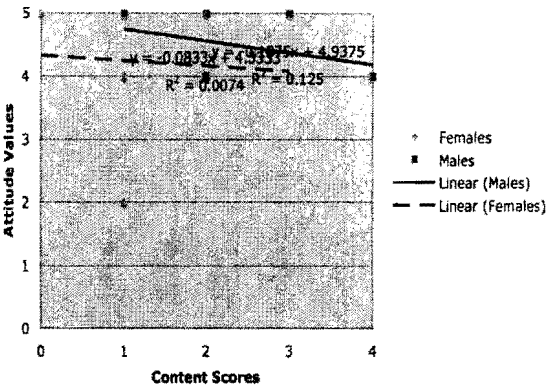

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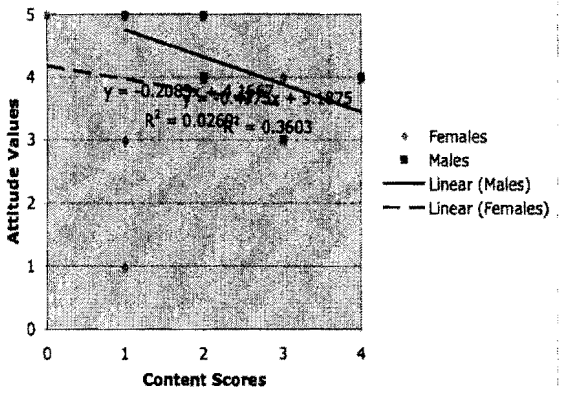

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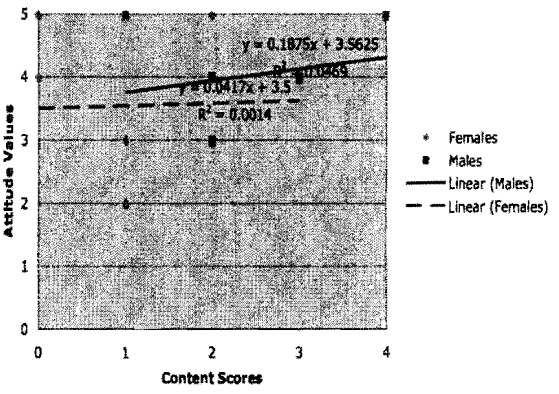

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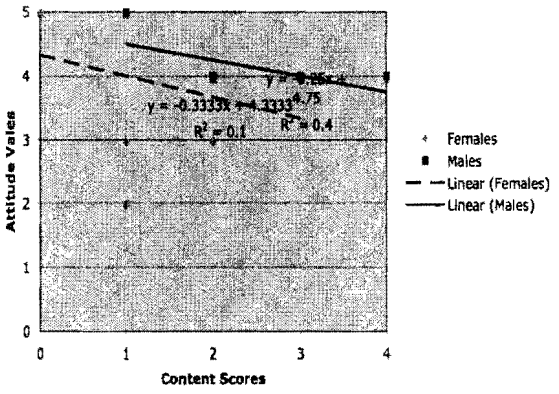

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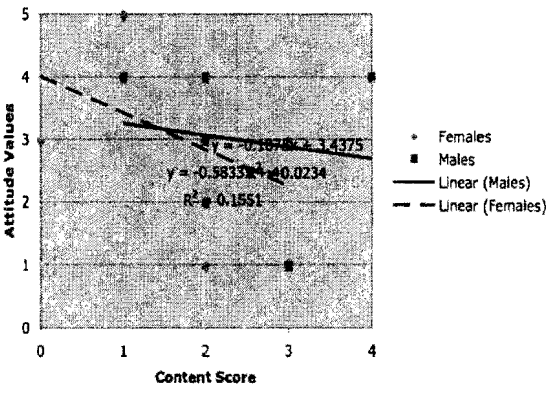

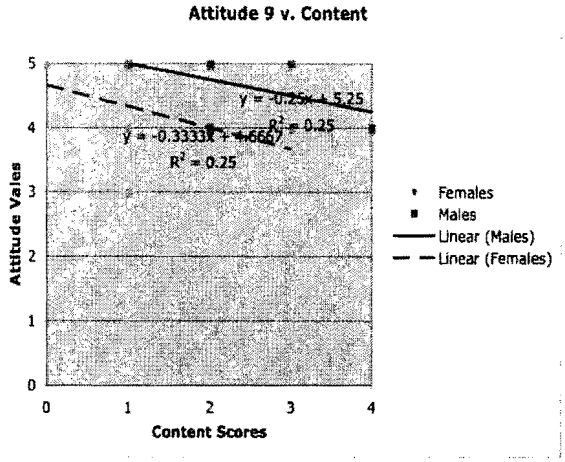

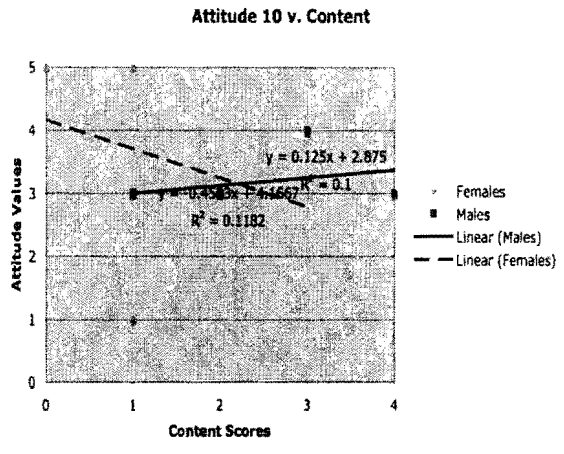

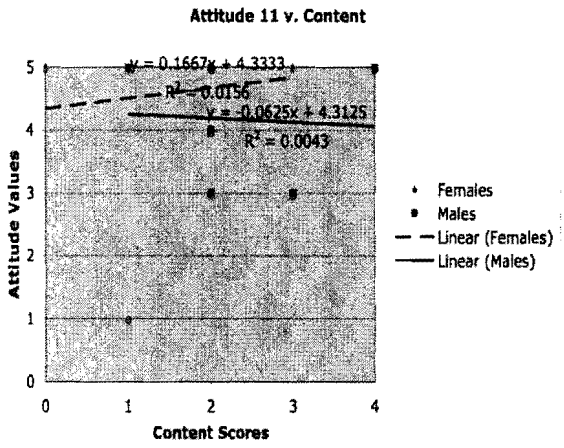

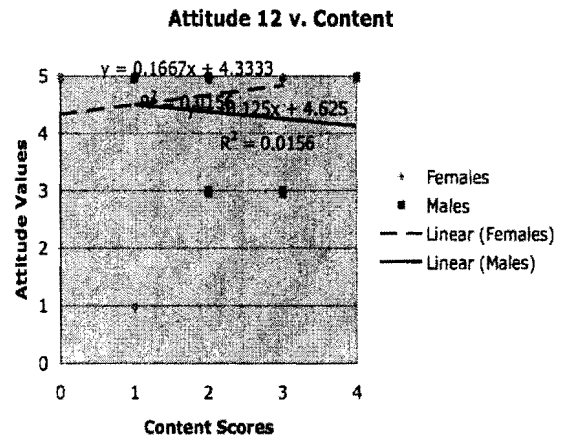

The above charts show very little correlation between content scores and attitude values based on the small R^2 values. For the purpose of this paper, only those survey questions that resulted in a linear regression model in which the slope of the line is greater than or equal to the absolute value of 0.25 and the R^2 value is greater than or equal to 0.1 will be evaluated.

This stipulation leaves no correlations to analyze for the population of females in the regular courses and only two for the population of males in the regular courses. According to the linear regression models, males in the regular courses attitude scores were more likely to agree with the statement, "Learning mathematics comes easily to

me," as their mathematics content scores increased. Specifically, the attitude value increased by 0.5841 points for each problem that was answered correctly in the mathematics content portion of the survey. Those who answered zero content questions correctly marked approximately a 2.9574 on the Likert scale. This linear regression model has an R^2 correlation of 0.3395. Also, males in the regular courses were more likely to agree with the statement, "When learning mathematics, I prefer to work independently," as their mathematics content scores increased. Specifically, the attitude value increased by 0.4374 points for each problem that was answered correctly in the mathematics content portion of the survey. Those who answered zero content questions correctly marked approximately a 2.7784 on the Likert scale. This linear regression model has an R^2 correlation of 0.1319.

The high-level courses, due to their smaller sampling sizes, are more likely to provide higher R^2 values. Thus, more of the linear regression models meet the above stated requirements for evaluation. Females in high-level courses were less likely to agree with the statement, "Learning mathematics is enjoyable for me," as their mathematics content scores increased. Specifically, the attitude value decreased by 0.25 points for each problem that was answered correctly in the mathematics content portion of the survey. Those who answered zero content questions correctly marked approximately a 4.3333 on the Likert scale. This linear regression model has an R^2 correlation of 0.25. Males in the high-level courses were more likely to agree with the statement, "Learning mathematics comes easily to me," as their mathematics content scores increased. Specifically, the attitude value increased by 0.5625 points for each problem that was answered correctly in the mathematics content portion of the survey.

Those who answered zero content questions correctly marked approximately a 2.6875 on the Likert scale. This linear regression model has an R^2 correlation of 0.4219. These numbers are all extremely similar to those of the males in the regular courses for the same attitude question. The next linear regression model has the highest level of correlation with an R^2 value of 0.7689. Females in the high-level courses were less likely to agree with the statement, "I look forward to mathematics class most days," as their mathematics content scores increased. Specifically, the attitude value decreased by 0.9583 points for each problem that was answered correctly in the mathematics content portion of the survey. Those who answered zero content questions correctly marked approximately a 4.5 on the Likert scale. Also, females in the high-level courses were less likely to agree with the statement, "I think I will use mathematics in my daily life when I am no longer in school," as their mathematics content scores increased. Specifically, the attitude value decreased by 0.4375 points for each problem that was answered correctly in the mathematics content portion of the survey. Those who answered zero content questions correctly marked approximately a 5.9875 on the Likert scale. This linear regression model has an R^2 correlation of 0.3603. Next, males and females in the high-level courses were less likely to agree with the statement, "Mathematics will be an important part of the job I hope to someday have," as their mathematics content scores increased. Specifically, the attitude value decreased by 0.25 points and 0.3333 points for each problem that was answered correctly in the mathematics content portion of the survey for males and females, respectively. Males who answered zero content questions correctly marked approximately a 4.75 on the Likert scale, compared to the female marking of 4.3333. The male linear regression model has an R^2 correlation of 0.4, while

the female linear regression model has an R^2 correlation of 0.1. Females in the high-level courses were also less likely to agree with the statement, "When learning mathematics, I prefer to work independently," as their mathematics content scores increased. Specifically, the attitude value decreased by 0.5833 points for each problem that was answered correctly in the mathematics content portion of the survey. Those who answered zero content questions correctly marked approximately a 4 on the Likert scale. This linear regression model has an R^2 correlation of 0.1551. Both males and females in the high-level courses were less likely to agree with the statement, "My parents think it is important for me to do well in mathematics courses," as their mathematics content scores increased. Specifically, the attitude value decreased by .25 points and 0.3333 points for each problem that was answered correctly in the mathematics content portion of the survey for males and females, respectively. Males who answered zero content questions correctly marked approximately a 5.25 on the Likert scale, compared to the female marking of 4.6666. Both linear regression models have an R^2 correlation of 0.25. Finally, females in the high-level courses were less likely to agree with the statement, "My parents would be happy if I chose a career in mathematics," as their mathematics content scores increased. Specifically, the attitude value decreased by 0.4583 points for each problem that was answered correctly in the mathematics content portion of the survey. Those who answered zero content questions correctly marked approximately a 4.1666 on the Likert scale. This linear regression model has an R^2 correlation of 0.1182.

Discussion of Results

My hypothesis before conducting this survey was that female students would perform at a lower level than their male counterparts. This supposition seemed to be

confirmed by the comparison of the means of each set of data. However, as stated above, despite the initial suspicions, it cannot be proven statistically that there is any kind of discrepancy between the mathematical performance of eighth-grade males and females at Greenwood Middle School. If this survey should ever be used again, the content portion should be revised. The fourth question was substantially harder than I had anticipated. Given that the goal of this survey was to usurp as little class time as possible, the mathematical content questions were meant to require thought but be quickly solvable. However, the fourth question was worded oddly and caused a great deal of confusion. Several students answered 4 pm, seeming to think that the question was asking the time if one-third of a twelve hour period had passed instead of the actual question, "What time is it now if the time that has passed since noon constitutes a third of the time that remains until midnight?" While some students did answer this question correctly, it is unclear as to whether or not this was simply luck. If used again, the fourth question should be modified to something more readily understood after only one reading. Also, the surveyor may want to include a few more mathematical content questions. Since there were only four questions, those students who were able to guess and answer a question correctly were able to significantly increase their scores. While it would extend the amount of time necessary to complete the survey, a sampling of ten questions may have been more representative of the actual skill levels of the students.

I was also surprised that there was little to no correlation between most of the attitude statements and content scores. It would be interesting to note the current grades of each student in relation to his or her other data since only the males seemed to have a correlation between their scores and their feelings of whether or not mathematics "came

easily" to them. However, this data does support the current research that states that girls may not recognize their own level of skill despite their positive mathematical performance.

That high-level females often had negative correlations in regard to their mathematical content scores was especially surprising and somewhat disheartening. Even despite increased performance, they did not seem to particularly enjoy mathematics, look forward to their mathematics class, view mathematics as useful for their daily life or career as an adult, or have parental support or encouragement in regard to their mathematical performance or pursuit of future endeavors. I had anticipated the data indicating the reverse effect—that females who scored higher mathematically might have parental support, a love of mathematics, and a desire to continue in the field in the future. However, it is important to keep in mind that, while the females may have had a negative correlation, all but one R2 value was less than 0.5 and all but one linear regression model started with an attitudinal value of more than 4 for a content score of zero. Also, one must take into consideration that there were only nine high-level females within the survey. When a wider sample was taken of the females in regular courses, there was no correspondence worth noting. It would be interesting to conduct this survey again with a larger number of high-level students.

A final factor that may have affected the data may have simply been the mood of the students as they were taking the survey. Particularly in the high-level course, there seemed to be a couple of girls who were more likely than most to mark low numbers on the Likert scale. Since both also marked higher numbers, it seemed unreasonable to

consider their scores outliers, but, again, a larger sampling size would have better counterbalanced any students in a particularly pessimistic or optimistic mood that day.

In conclusion, this survey confirmed none of my earlier propositions. There appears to be no current discrepancy in gender performance and the attitudes of students themselves, their peers or their parents seems to have very little to do with their mathematical performance based on a few non-gender biased story problems. While this study has been unable to confirm or deny those claims made by earlier research, it is my hope that it might be the starting point for further consideration of the matter.

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Demographic Information: Circle the following as they apply to you.

1. Sex: Male Female

2. Age: 11 12 13 14 15+

Mathematics Content:

1. One day Jon and Peter visit a library together. After that, John visits the library regularly every two days, at noon. Peter visits the library every three days, also at noon. If the library opens every day, **how many days** after the first visit will it be before they are, once again, in the library together?

2. In an athletics race Mary is 10 meters ahead of Jessica. Liz is 4 meters ahead of Kate, and Kate is 3 meters ahead of Jessica. How many meters is Mary ahead of Liz?

3. Some sparrows are sitting in two trees, with each tree having the same number of sparrows. Two sparrows then fly from the first tree **to the second tree**. How many **more** sparrows does the second tree then have than the first tree?

4. What time is it now if the time that has passed since noon constitutes a third of the time that remains until midnight?

Attitudes: Circle the number that corresponds to your personal attitude/thought about the following statements.

Scale:	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	1	2	3	4	5

1. Learning mathematics is enjoyable for me.

   1 2 3 4 5

2. Learning mathematics comes easily to me.

   1 2 3 4 5

3. I look forward to mathematics class most days.

   1 2 3 4 5

4. I think mathematics is important to learn.

   1 2 3 4 5

5. I think I will use mathematics in my daily life when I am no longer in school.

   1 2 3 4 5

6. I plan to take calculus in high school.

   1 2 3 4 5

7. Mathematics will be an important part of the job I hope to someday have.

   1 2 3 4 5

8. When learning mathematics, I prefer to work independently.

   1 2 3 4 5

9. My parents think it is important for me to do well in mathematics courses.

   1 2 3 4 5

10. My parents would be happy if I chose a career in mathematics.

    1 2 3 4 5

11. Girls who are good at math can also be cool.

    1 2 3 4 5

12. Boys who are good at math can also be cool.

    1 2 3 4 5

Gender Equity in the Mathematics Classroom

My name is Jill Wisley, and I am a senior at Ball State University currently working on my senior thesis about gender equity in the mathematics classroom. To further enhance my project, I request your permission to involve your child in an **anonymous** survey. The survey takes only a few minutes of class time and includes a few math problems as well as some agree/disagree questions dealing with parent, peer, and individual attitudes toward mathematics. All results will be kept completely confidential, and you or your child have the right at any point to withdraw from the survey without any penalty. There are no foreseeable risks associated with this study, but please feel free to direct any questions to me before signing this Parental Permission form. ***Your child's grade will in no way be affected by choosing whether or not to participate.*** I appreciate your help and consideration.

****

I give permission for my child to participate in this research project entitled, "Gender Equity in the Mathematics Classroom." My questions have been answered to my satisfaction. I have read the description of this project and give my permission for my child to participate.

Parent Signature: _____

Date: _____

Child assent statement:
The research project has been explained to me and I have had the opportunity to ask questions. I understand what I am being asked to do as a participant. I agree to participate in the research.

Student Signature: _____

Date: _____

For questions about your rights as a research subject, please contact Melanie L. Morris, Coordinator of Research Compliance, Office of Academic Research and Sponsored Programs, Ball State University, Muncie, IN 47306, (765) 285-5070, irb@bsu.edu.

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	Sex	Mathematics Content					Attitudes											
		1	2	3	4	*Total Correct*	1	2	3	4	5	6	7	8	9	10	11	12
1	F	n/a	N	N	N	***0***	3	2	3	5	4	5	1	3	5	3	5	5
2	F	N	n/a	N	N	***0***	3	3	5	5	4	2	3	2	5	3	5	5
3	F	N	N	N	N	***0***	5	5	5	5	5	4	5	5	5	4	5	5
4	F	N	N	N	N	***0***	3	3	4	4	2	2	2	5	5	3	5	3
5	F	N	N	N	N	***0***	4	3	2	5	5	3	5	3	3	5	5	5
6	F	N	N	N	N	***0***	2	1	1	4	3	3	1	3	4	3	5	5
7	F	n/a	n/a	n/a	n/a	***0***	5	4	4	5	5	3	5	4	5	5	5	5
8	F	N	N	N	N	***0***	4	4	3	4	4	3	3	4	4	4	4	4
9	F	N	N	N	N	***0***	4	2	4	5	4	3	4	3	4	3	5	5
10	F	N	N	N	n/a	***0***	3	2	4	4	2	2	5	1	3	3	5	5
11	F	n/a	N	N	N	***0***	5	4	4	5	5	4	5	4	5	4	5	5
12	F	N	N	N	N	***0***	5	3	5	4	4	2	5	4	5	3	5	5
13	F	N	N	N	n/a	***0***	3	3	2	4	4	2	3	2	4	3	5	5
14	F	n/a	n/a	N	n/a	***0***	2.50	1	2	4	5	3	4	2	5	3	3	3
15	F	N	N	N	N	***0***	4	4	5	5	5	5	5	4	5	3	5	5
16	F	N	N	N	N	***0***	4	4	4	5	4	4	3	5	5	3	5	5
17	F	N	N	N	N	***0***	2	2	1	5	3	3	2	2	4	3	4	4
18	F	N	N	N	n/a	***0***	3	2	4	5	4	5	5	2	4	3	5	5
19	F	n/a	Y	n/a	n/a	***0***	4	5	3	3	5	2	3	4	5	3	5	1
20	F	N	N	N	N	***0***	3	2	3	4	3	2	1	3	5	3	3	3
21	F	n/a	N	n/a	n/a	***0***	1	1	1	2	1	1	2	1	2	1	3	1
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23	F	N	N	N	N	***0***	3	3	3	4	5	4	5	4	5	4	5	5
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34	F	N	Y	N	N	***1***	2	2	3	5	3	5	3	1	5	3	5	5
35	F	Y	N	N	N	***1***	3	3	3	5	5	4	3	4	5	3	5	5
36	F	N	N	N	Y	***1***	5	5	5	5	5	4	3	5	5	1	1	1
37	F	N	Y	N	N	***1***	3	4	3	5	5	5	3	2	4	2	3	3
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39	F	Y	N	N	N	***1***	4	5	3	5	4	4	3	5	5	3	5	5
40	F	N	Y	N	N	***1***	5	5	4	4	5	4	5	5	5	4	5	5
41	F	N	Y	N	N	***1***	3	3	2	5	5	3	5	4	5	3	5	5
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43	F	Y	N	N	N	***1***	4	4	5	3	3	4	2	2	3	3	5	5
44	F	N	Y	N	N	***1***	2	4	1	2	5	3	3	1	5	3	3	3
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71	F	Y	Y	N	N	***2***	4	4	4	5	5	3	5	4	5	2	5	5
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74	F	Y	Y	N	N	***2***	4	5	4	5	5	5	5	4	5	4	5	5
75	F	Y	Y	N	N	***2***	3	4	4	4	3	3	3	2	4	4	4	4
76	F	Y	Y	N	N	***2***	5	5	5	5	4	5	5	4	4	5	5	5
77	F	Y	Y	N	Y	***3***	4	3	3	5	5	4	5	5	5	4	5	5
78	F	Y	Y	Y	N	***3***	2	3	2	5	4	4	3	2	5	3	4	4
79	F	Y	Y	Y	N	***3***	5	5	5	5	5	5	5	4	5	5	5	5
80	F	Y	Y	Y	N	***3***	3	2	3	5	5	5	5	3	5	3	5	5
						0.875	***3.419***	***3.250***	***3.313***	***4.438***	***4.175***	***3.388***	***3.600***	***3.150***	***4.463***	***3.250***	***4.269***	***4.088***

	Sex	Mathematics Content					Attitudes											
	1	2	3	4	*Total Correct*	1	2	3	4	5	6	7	8	9	10	11	12
1	M	N	N	N	n/a	***0***	2	1	3	5	4	2	3	4	4	4	2	2
2	M	N	n/a	N	n/a	***0***	3	3	1	5	5	1	4	1	5	3	5	5
3	M	N	N	N	N	***0***	3	2	3	5	5	4	4	3	5	3	5	5
4	M	N	N	N	N	***0***	5	4	4	5	5	4	5	4	5	5	4	4
5	M	N	N	N	N	***0***	2	2	1	5	2	1	3	2	5	3	5	5
6	M	N	N	N	N	***0***	3	2	2	5	5	1	3	1	5	3	4	4
7	M	N	n/a	N	N	***0***	5	5	5	5	5	5	5	5	5	5	5	5
8	M	N	N	N	N	***0***	4	4	4	5	5	3	3	4	5	3	3	3
9	M	N	N	N	N	***0***	5	4	4	5	5	5	5	5	5	5	3	3
10	M	N	N	N	N	***0***	3	2	3	5	5	1	5	4	5	4	1	1
11	M	N	N	N	N	***0***	5	4	4	4	4	4	5	4	4	3	5	5
12	M	N	N	N	N	***0***	3	2	2	4	3	2	3	1	5	3	5	5
13	M	N	N	N	n/a	***0***	1	2	1	1	2	1	2	2	4	3	5	5
14	M	N	N	N	N	***0***	4	3	3	4	5	4	3	4	4	3	3	3
15	M	Y	N	N	N	***1***	3	2	2	5	3	4	3	2	4	2	5	5
16	M	N	Y	N	N	***1***	5	5	5	5	5	4	5	2	5	3	5	5
17	M	N	Y	N	N	***1***	5	4	3	5	5	4	5	3	4	4	5	5
18	M	N	Y	N	N	***1***	4	3	4	5	4	3	4	3	5	4	4	4
19	M	N	Y	N	N	***1***	4	4	4	5	5	5	4	5	5	4	4	4
20	M	N	Y	N	N	***1***	3	4	4	5	5	4	2	1	5	3	5	5
21	M	Y	N	N	N	***1***	4	4	4	3	3	5	2	4	3	3	3	4
22	M	Y	N	N	N	***1***	4	2	5	5	4	5	3	1	5	5	4	4
23	M	N	Y	N	n/a	***1***	3	3	3	4	5	4	4	3	4	4	5	5
24	M	N	Y	N	N	***1***	4	4	4	4	3	3	3	3	5	4	4	4
25	M	Y	N	N	N	***1***	4	5	5	5	4	4	3	2	5	3	5	5
26	M	Y	N	N	N	***1***	4	4	5	5	5	5	4	4	5	5	5	5
27	M	Y	N	N	N	***1***	5	4	5	5	5	4	5	1	5	4	3	3
28	M	Y	Y	N	N	***2***	4	4	3	4	5	5	3	5	5	3	3	3
29	M	N	Y	N	Y	***2***	4	3	4	4	3	4	5	5	4	3	4	5

30	M	Y	Y	N	N	***2***	5	5	5	4	5	3	4	5	4	5	4	5
31	M	Y	Y	N	N	***2***	3	4	3	2	4	3	2	2	4	3	5	5
32	M	Y	Y	N	N	***2***	4	4	5	5	5	3	2	3	5	3	3	3
33	M	N	Y	Y	N	***2***	2	4	2	3	3	3	3	3	3	3	3	3
34	M	Y	Y	N	N	***2***	5	5	5	5	5	5	5	4	5	5	5	5
35	M	N	N	Y	Y	***2***	3	4	3	4	4	5	4	3	5	3	5	5
36	M	Y	Y	Y	N	***3***	4	5	4	5	5	4	5	5	5	5	5	5
37	M	Y	Y	Y	N	***3***	3	5	2	3	2	4	3	4	4	3	3	3
38	M	Y	Y	Y	N	***3***	3	3	4	5	5	5	3	3	5	3	5	5
39	M	Y	Y	Y	N	***3***	4	5	4	3	4	2	2	5	5	3	5	5
40	M	Y	Y	Y	N	***3***	4	5	5	4	4	4	4	5	5	4	4	4
41	M	Y	Y	Y	N	***3***	3	5	2	4	3	3	5	4	5	4	3	4
42	M	Y	Y	Y	Y	***4***	4	5	4	4	4	3	4	5	4	4	3	5
						1.214	***3.690***	***3.667***	***3.524***	***4.357***	***4.214***	***3.524***	***3.667***	***3.310***	***4.619***	***3.619***	***4.095***	***4.238***

	Sex	Mathematics Content					Attitudes											
		1	2	3	4	Total Correct	1	2	3	4	5	6	7	8	9	10	11	12
1	F	N	N	N	N	**0**	4	3	4	5	5	5	5	3	5	5	5	5
2	F	N	N	N	N	**0**	4	4	5	5	5	4	5	3	5	5	5	5
3	F	N	Y	N	N	**1**	4	3	3	4	3	2	2	5	5	1	1	1
4	F	N	Y	N	N	**1**	4	4	4	4	5	3	3	5	4	3	5	5
5	F	Y	N	N	N	**1**	5	3	4	2	1	2	5	5	3	5	5	5
6	F	Y	Y	N	N	**2**	4	4	2	5	4	5	4	1	4	3	5	5
7	F	Y	Y	N	N	**2**	4	4	3	4	4	3	3	2	4	3	5	5
8	F	N	Y	Y	N	**2**	4	3	2	5	4	4	4	2	4	3	5	5
9	F	Y	Y	Y	N	**3**	3	4	2	4	4	4	4	3	4	4	5	5
						1.333	***4.000***	***3.556***	***3.222***	***4.222***	***3.889***	***3.556***	***3.889***	***3.222***	***4.222***	***3.556***	***4.556***	***4.556***
1	M	N	Y	N	N	**1**	5	3	4	5	5	5	5	4	5	3	5	5
2	M	N	Y	Y	N	**2**	4	4	3	5	5	4	4	3	5	3	5	5
3	M	Y	Y	N	N	**2**	3	3	4	4	4	3	4	2	4	3	4	5
4	M	N	Y	Y	N	**2**	3	5	3	4	4	3	4	4	5	3	3	3
5	M	Y	Y	Y	N	**3**	4	4	4	5	3	4	4	1	5	4	3	3
6	M	Y	Y	Y	Y	**4**	5	5	4	4	4	5	4	4	4	3	5	5
						2.333	***4.000***	***4.000***	***3.667***	***4.500***	***4.167***	***4.000***	***4.167***	***3.000***	***4.667***	***3.167***	***4.167***	***4.333***